5.1

ARCO Petroleum Products Company
515 South Flower Street
Los Angeles, California 90071
Telephone 213 486 1713

Roseann C. Stevenson
Manager
Superfund Policy and Multiparty Sites

TES4-T10-3513-02-G2-09-001

1/5188

January 5, 1988

Ms. Lori Cohen
U.S. Environmental Protection Agency
Superfund Branch HW-113
1200 6th Avenue
Seattle, WA 98101

Dear Ms. Cohen,

RE: Harbor Island Superfund Site

Pursuant to your request for additional information, ARCO Petroleum Products Company has attached our response. We apologize for the delay in this response, however, the environmental assessment report for the work performed in July was just received. This report included the boring and well logs which were requested.

Should you have any questions or require additional information, please contact me at 213/486-1713.

Sincerely,

RG Stevenson for

R. C. Stevenson

ATTACHMENT

cc: J.A. Miller
J.P. Meck

441330

ARCO Petroleum Products Company, on behalf of Atlantic Richfield Company, objects to all of the information requested since it is not limited to hazardous wastes as defined by applicable federal and state statutes and regulations. To the extent that it is not so limited, it is beyond the scope of both RCRA and CERCLA, as amended. Without waiving this objection ARCO responds as follows.

1. Yes, ARCO regular gasoline which contains lead is stored on site. The attached Material Data Sheet indicates that lead alkyls are contained.

2. No, lead is added at the refinery.

3. Current practice is to determine if the material is hazardous pursuant to state regulations and properly transport and dispose of the material. Our files on tank cleanings prior to the promulgation of hazardous waste regulations do not indicate the final disposition of this material. General industry practice during this time was to spread the material and allow aeration to, if appropriate, mitigate any hazard posed by the material.

Our records indicate that a firm by the name of Haworth & Son, currently identified as Ryan & Haworth, 20519 60th Ave. W., Lynwood WA, performed all tank cleaning.

4. No, any lead is currently added at the refinery. Past practice may have been to add the lead at the facility, however, we have not been able to determine if this practice was utilized and, if so, when this practice may have been discontinued.

5. Yes there are two (2) oil/water separators at this facility. Both are permitted with one discharge to the river and the other to the metro sewer system. Sand/sediment from these separators are evaluated for hazardous characteristics pursuant to state law and are then properly transported and disposed of. Past practice and current practice if the material is not deemed to be regulated, is to spread the material onsite.

6. Yes, the material is a protein foam. No sludge has been generated from the foam tank.

7. Yes, Shell Sol which is a mixture of mineral spirits and petroleum solvents and Chevron Thinner 325 which is a mixture of petroleum solvents. MSDS's for these chemicals are attached.

8. Storage is in drums. Shell Sol has a usage rate of 75 gpy and Chevron Thinner has a usage rate of 220 gpy.

9. No leak detection systems are in place. Leak detection is by both visual and volume checks.

10. The information on spill history at this facility is attached.

11. The information on underground tanks is attached. Monitoring is by volume, no leak detection in place.

12. An oily sheen has been noticed when the tide goes out along the shoreline of the facility. A well was completed to monitor this occurence. This well is apparently still in place. No information on the well is available.

13. No information is available for this request. Should the information become available, it will be forwarded to you. At this time, we believe that these wells are still in place.

14. See answer to 13 above.

15. Yes, there are currently three (3) recovery wells in operation at the facility. ARCO performed an environmental assessment to evaluate the sheen reported in 12 above. This assessment included a comprehensive boring and drilling operation at the facility. All boring and well logs are attached. All borings were grouted in. All monitoring wells are in place.

The reason that this program was commenced was that no information on the previously drilled wells, including logs and specifications was available.

16. We believe that this information was previously submitted. If not, we will supply it if necessary.

17 & 20 Clean Sound has an office on this property and performs cleanups of spills and other incidents on the river. An underground heating oil tank is located on this property.

Stevedoring Services of America uses this area for the storage of steel used in building construction.

Seattle Freight uses this area for their mobile office and stores tractor/trailers on the property. Minor repairs of vehicles is apparently performed.

18. No, no gasoline filters are used.

19. A map of the facility with the location of tankage as well as the boring and well locations is attached. The tanks have been painted in the past, however, no information on the sandblasting material and its final disposition is available. No information on whether the paint contained lead is available.

PS5027

Received at Facility 4-07-86

APPCO SUPPLIER MSDS REVIEW CHECKLIST

Section I

1. Facility LOA723 Technical Review Date 4-07-86 Reviewer D C Herrs, Ph D
2. MSDS No. F-PS 5027 Supplier MSDS Date 10/82
3. Supplier MSDS # 1
4. Material Name MINERAL SPIRITS SHELL SOL/MINERAL SPIRITS (SOLVENT)
5. Manufacturer Name SHELL CANADA LIMITED, TORONTO ONTARIO O.D. SNIDER, SUMNER, WA.

Section II - Primary APPCo Review

	Response*
1. Does Supplier state material is an HCR Hazardous Chemical?	Y___ N X U___
In absence of supplier statement, do you consider the material a HCR Hazardous Chemical? If yes, explain your decision basis. flammable - health effects	Y X N___ U___
2. Does the MSDS adequately identify hazards, personal protective equipment and safe handling practices? If not, explain.	Y X N___ U___

4/25/86

3. Assign Labeling Categories (per Labeling Program)

DANGER	
WARNING	X
CAUTION	

HEALTH	1
FIRE	2
REACTIVITY	0
OTHER	

} from MSDS

4-Extreme, 3-High, 2-Moderate, 1-Slight, 0-No Significant Hazard, Other (See NFPA)

Section III - Review for Local Use

1. Do you recommend the intended use of this product in your facility? Y___ N___ U___

   List any special conditions or restrictions to your acceptance.

2. Management Approval of Use _____ Date _____ (If needed)

* Y = Yes, N = No, U = Uncertain.

Upon completion forward one copy with the MSDS to APPCo Central MSDS File at E&H AP 3320.

3/86

- Warehouse Society -

PS 5027

NOTED

FEB 25 1986

S. B. HUBBARD

INDUSTRIAL HYGIENE

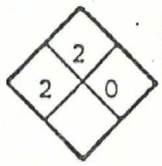
OCT 12 1982

Shell Canada Code 642-100

SHELL CANADA LIMITED

MATERIAL SAFETY DATA SHEET

Hazard Rating (NFPA-704M)



SECTION I

MANUFACTURES NAME: SHELL CANADA LIMITED	EMERGENCY TELEPHONE NO. SHELL: 416-597-7042 (bs. hrs.)
ADDRESS: P.O. BOX 400, TERMINAL A, TORONTO, ONTARIO, M5W 1E1	POISON CONTROL CENTRES 416-597-1500 (24 hrs.) 418-656-8000 (24 hrs.)
CHEMICAL NAME AND SYNONYMS: MINERAL SPIRITS/PETROLEUM SOLVENT	TRADE NAME: SHELL SOL/MINERAL SPIRITS
CHEMICAL FAMILY: HYDROCARBON	FORMULA:

SECTION II HAZARDOUS INGREDIENTS*

COMPOSITION	%	SPECIES	LD_{50} mg/kg ORAL	LD_{50} mg/kg DERMAL	LC_{50} CONCENTRATION	LC_{50} mg/m³ HOURS
Hydrocarbon Analysis						
o Saturates (% vol.)	89-94	+				
o Aromatics (% vol.)	6-15	RAT [1]	> 8000	> 4000	> 14100	4
o Sulphur (% by mass)	.1 max.					
BENZENE CONTENT						
PAH CONTENT						

REFERENCES + Oaraffins and Naphthenes

1. Shell Data

SECTION III PHYSICAL DATA

BOILING POINT °F(°C): 320-400	(160-204)	SPECIFIC GRAVITY (H_2O = 1) @ 60°F (15.6°C)	.787-.798
VAPOR PRESSURE (mmHg) @ 100°F (38°C)	7.0	PERCENT VOLATILE BY VOLUME (%)	100
VAPOR DENSITY (AIR = 1)	4.8	EVAPORATION RATE (nBuAC = 1) nBuAC/Solvent	.1
SOLUBILITY IN WATER	INSOL.	VISCOSITY	
APPEARANCE AND ODOR: Light colour, clear, liquid, hydrocarbon odour		AUTOIGNITION TEMP °F(°C)	

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) °F(°C): 105 (40.5) Tag Closed Cup	FLAMMABLE LIMITS % VOL. IN AIR	Lel: 1.0	Uel: 6.0

EXTINGUISHING MEDIA: Use CO_2, foam, water fog, dry chemicals (preferred)

SPECIAL FIRE FIGHTING PROCEDURES

Exclude air; do not use water except as a fog. Handle as a flammable liquid. Wear adequate respiratory protection.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Vapour forms an explosive mixture between upper and lower flammable limits.

SECTION V HEALTH HAZARD DATA SHELL SOL

THRESHOLD LIMIT VALUE
Suggested TLV 100 ppm (525 mg/m^3) value for Stoddard Solvent ACGIH 1980.

EFFECTS OF OVEREXPOSURE

SKIN AND EYES: Moderately irritating to skin and eyes; repeated or prolonged contact can cause dermatitis.

INHALATION: The vapours are moderately irritating to the eyes and respiratory passages. Prolonged exposure to high vapour concentration can cause headaches, nausea, dizziness, anesthesia and central nervous system depression and in rare cases may sensitize heart muscles causing heart arrythmia.

INGESTION:

CARCINOGENIC HAZARD:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove victim to fresh air and restore breathing if required.

SKIN AND EYES: Wash contaminated skin with mild soap and water. Flush eyes with water for at least 15 minutes. Wash contaminated clothing before reuse.

INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL HELP IMMEDIATELY.

SECTION VI REACTIVITY DATA

STABLE	X	UNSTABLE		CONDITIONS TO AVOID
				Avoid spark, open flames and all other sources of ignition.

INCOMPATIBLE MATERIALS Avoid strong oxidizing materials

HAZARDOUS DECOMPOSITION PRODUCTS CO, CO_2 produced on combustion

HAZARDOUS POLYMERIZATION	YES		NO	X	CONDITIONS TO AVOID

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Eliminate all sources of ignition. Flush with water to an open, well-ventilated area. Wear adequate respiratory protection. Absorb with absorbent material. Remove to a container. KEEP MATERIAL AWAY FROM SEWERS AND WATERWAYS.

WASTE DISPOSAL METHOD

Dispose of by controlled (approved incinerator) burning or landfill the absorbed material in an (Government) approved site.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Approved organic canister mask or air supplied respirator.

VENTILATION

LOCAL EXHAUST Desirable

MECHANICAL (General) To maintain suggested TLV; electrical & mechanical equipment should be spark proof.

PROTECTIVE GLOVES Impervious Rubber Gloves

EYE PROTECTION Chemical safety goggles to guard against splashing.

OTHER Overalls, Apron

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING, STORAGE AND USE:

Store in cool, well-ventilated area. Avoid all sources of ignition. Avoid excessive heat. Avoid prolonged or repeated contact with skin. Avoid breathing vapours. Use normal, good, personal hygiene.

SHELL CANADA LIMITED

PER R.J. Fliegl

DATE October 1982

Shell Canada Limited assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally Shell Canada Limited, assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Futhermore, vendee assumes the risk in his use of the material.

Dear Customer: This MSDS contains important environmental, health and toxicology information for your employees who recently ordered this product. Please make sure this information is given to them. If you resell this product, this MSDS should be given to the Buyer. This Form may be reproduced without permission.

Chevron U.S.A. Inc.

Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200). (Formerly Called MATERIAL INFORMATION BULLETIN)

CHEVRON Thinner 325 CPS 218223

DANGER! HARMFUL OR FATAL IF SWALLOWED
COMBUSTIBLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Light petroleum distillate (CAS 64742-47-8) containing:	
Paraffins and naphthenes	98%
Aromatics:	
C_9-C_{11} alkylbenzenes (CAS 68515-25-3)	2%
Benzene (CAS 71-43-2)	<.02%

EXPOSURE STANDARD

No Federal OSHA exposure standard or ACGIH TLV has been established for this material. Based on information reviewed to date, we recommend an exposure standard of 100 ppm for a daily 8-hour exposure.

PHYSIOLOGICAL & HEALTH EFFECTS	EMERGENCY & FIRST AID PROCEDURES
Eyes	
Expected to cause no more than minor eye irritation. Application of a similar material into the eyes of rabbits produced slight membrane irritation without corneal injury.	Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If irritation persists, see a doctor.
Skin	
Not a primary skin irritant but may cause skin irritation on prolonged or frequently repeated contact. Application of a similar material onto the skin of rabbits produced moderate erythema and edema. The Draize score was 3.7. See Additional Health Data.	Wash skin thoroughly with soap and water. See a doctor if irritation occurs. Launder contaminated clothing.
Inhalation	
Expected to have slight acute toxicity by inhalation. The inhalation LC_{50} (rat) of a similar product for a one-hour exposure was greater than 13.3 mg/liter. Breathing the vapors at concentrations above the recommended exposure standard can cause central nervous system effects. See Additional Health Data.	If there are signs or symptoms, as described in this MSDS, due to breathing this material, move person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately.
Ingestion	
Not expected to be acutely toxic by ingestion. The acute oral LD_{50} (rat) for a similar product was greater than 15.3 g/kg. Note to Physician: Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.	If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

ADDITIONAL HEALTH DATA

See following pages

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Do not get in eyes. Eye contact can be avoided by wearing chemical safety goggles.

Skin Protection: Avoid prolonged or frequently repeated skin contact with material. Skin contact can be minimized by wearing impervious protective clothing including rubber gloves.

Respiratory Protection: Wear approved respiratory protection such as an organic vapor cartridge respirator or an air-supplying respirator unless ventilation equipment is adequate to keep airborne concentrations below the recommended exposure standard.

Ventilation: Use adequate ventilation to keep airborne concentrations of this material below the recommended exposure standard.

FIRE PROTECTION

Liquid evaporates and forms vapors (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85°F.

Flash Point: (TCC)105°F(41°C) Min.

Autoignition Temp.: 500°F (260°C)

Flammability Limits: 1.0-6.0%

Extinguishing Media: CO_2, Dry Chemical, Foam, Water Fog.

Special Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire spaces without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Read the entire MSDS.

SPECIAL PRECAUTIONS

See following pages

ENVIRONMENTAL PROTECTION

Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situatuions which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used.

Precautions if Material is Released or Spilled: Eliminate all open flame in vicinity of spill or released vapor. Stop the source of the leak or release. Clean up releases as soon as possible, observing precautions in Special Protective Information. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

Waste Disposal Methods: Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.

Incompatibility (Materials to Avoid): May react with strong oxidizing materials.

Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES

Solubility: Miscible with hydrocarbons; insoluble in water.

Appearance (Color, Odor, etc.): Colorless liquid.

Boiling Point: 166°C (330°F) 5% Rec. (Max.)

Melting Point: n/a

Specific Gravity: 0.78 @ 15.6/15.6°C

Vapor Pressure: 5 mm Hg @ 77°F

Vapor Density (Air=1): 4.8

Percent Volatile (Volume %): 99+

Evaporation: (Bu Ac=1) 0.22

Viscosity: 0.96 cSt @ 37.8°C

n/a = Not Applicable

Material Safety Data Sheet

CHEVRON Thinner 325 CPS 218223

ADDITIONAL HEALTH DATA

Not expected to be acutely toxic by skin contact; the acute dermal LD_{50} (rabbit) for a similar product was greater than 19.1 g/kg.

Signs and symptoms of central nervous system effects may include one or more of the following: headache, dizziness, loss of appetite, weakness and loss of coordination. Affected persons usually experience complete recovery when removed from exposure area.

SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

DO NOT USE OR STORE near flame, sparks, or hot surfaces. USE ONLY IN WELL VENTILATED AREA. Keep container closed.

DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

CAUTION! Do not use pressure to empty drum or explosion may result.

HMIS Hazard Rating:

Reactivity: 0, Flammability: 2, Health: 1

Spill History of the
ARCO Seattle Petroleum Products Terminal

Corrected Copy

February 6, 1987

2,000 galllons of regular leaded gasoline were released from a roof drain failure in tank number one. The released product floated on top of water in the tank dike and was fully recovered using a vacuum truck.

December 19, 1979

15 to 20 gallons of diesel were released when the oil/water separator overflowed due to heavy rains. This product was completely recovered using a vacuum truck.

June 8, 1979

8,473 gallons of regular leaded gasoline were released when tank number nine was overfilled. The product was not recovered at the request of the USCG and the fire department (due to their concern for the fire hazards involved).

1968 through 1972

We know that there was a black oil spill when tank number eleven over flowed sometime during the above stated four year period. We do not know the exact date, the amount or if any of the product was recovered.

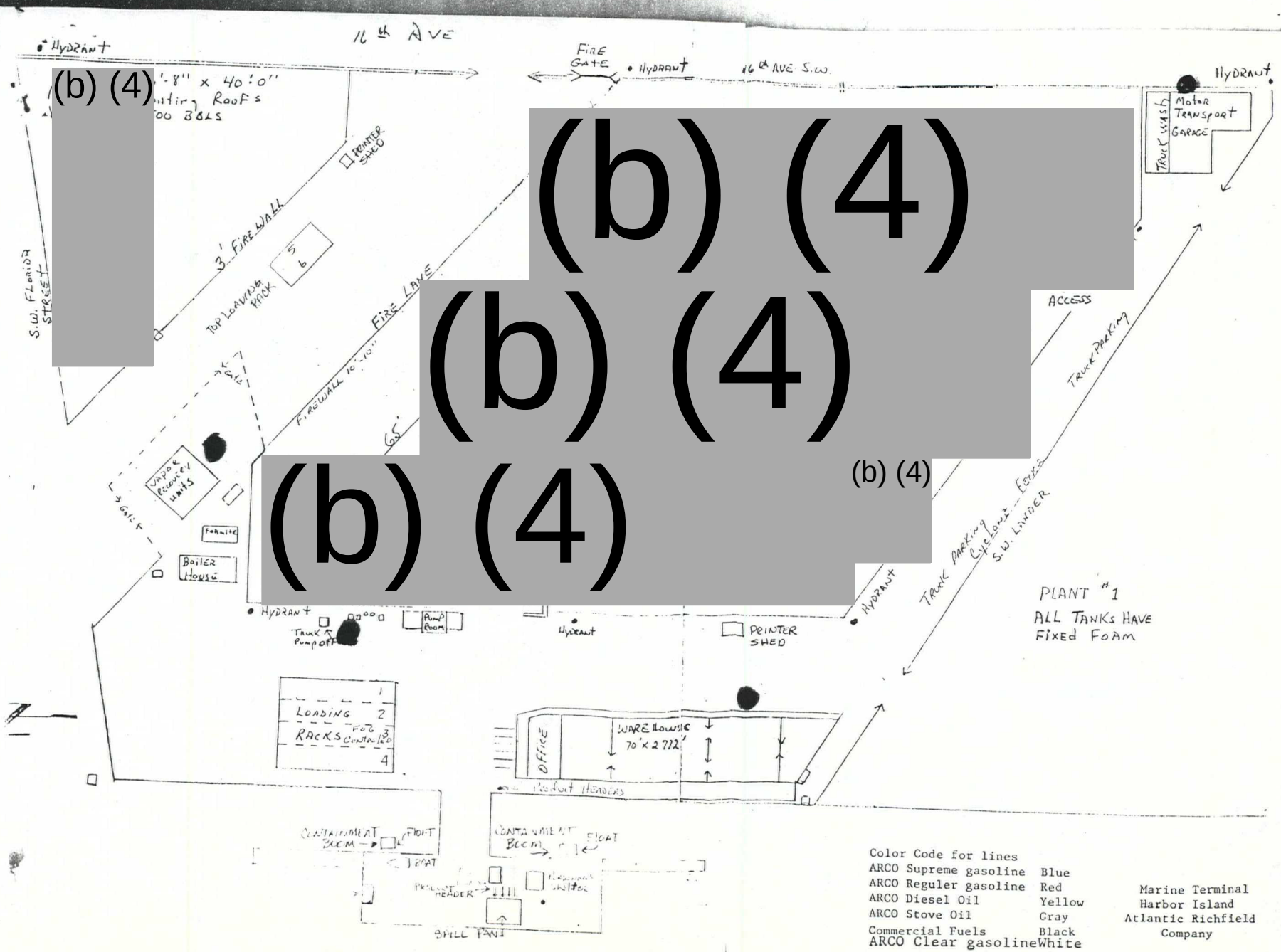
DATE: 8/28/87

SEATTLE

UNDER GROUND TANKS

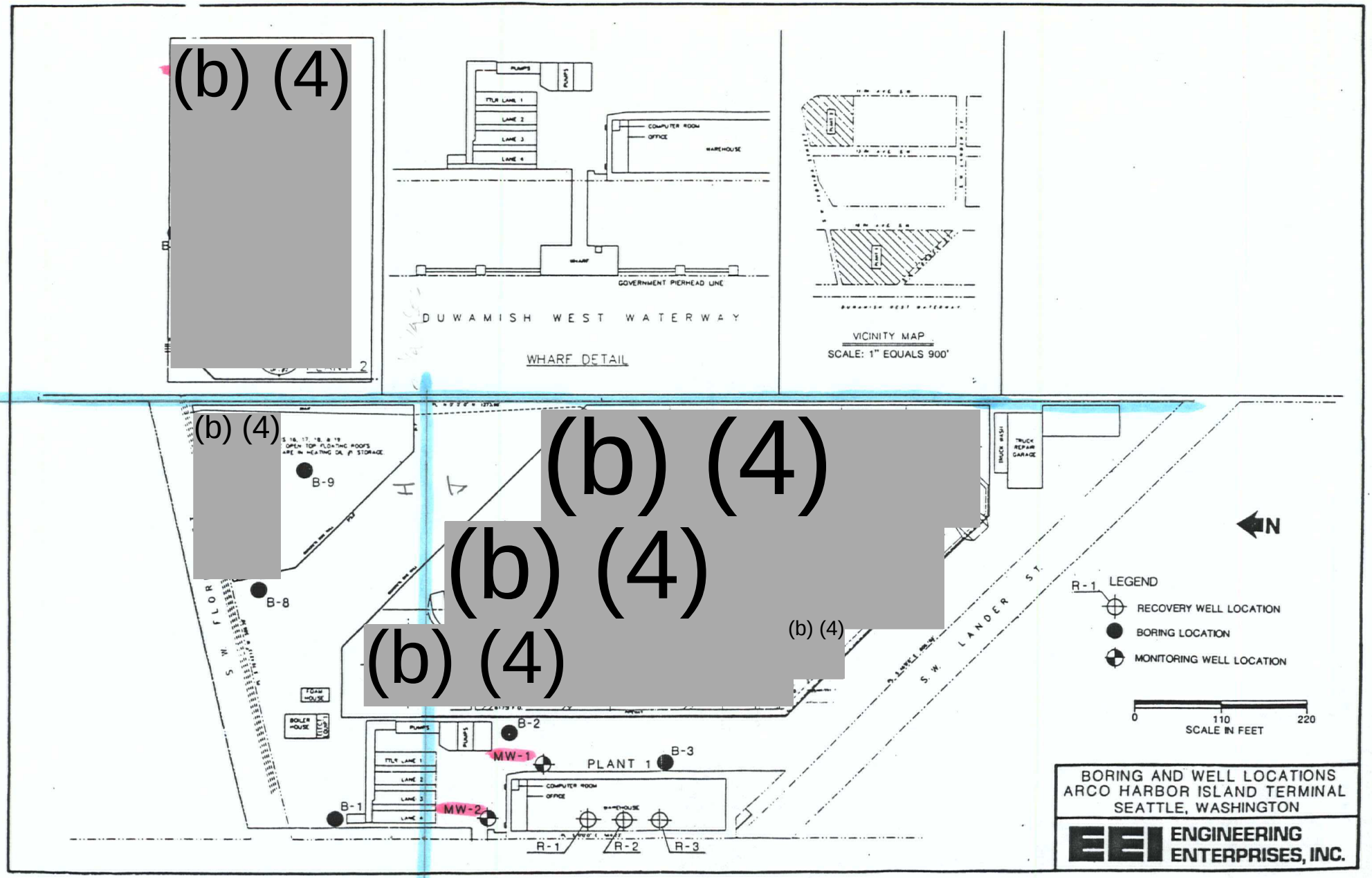
TANK	SIZE	AGE	LAST TEST
1. T & T Rack Drop Out Tank	(b) (4) gal	9 + yrs	6/27/84
2. Vapor Recover Drop Out Tank	gal	7 yrs	7/23/84
3. Sample/Bleeder for Pipeline Receipts	gal	7 yrs	6/22/84
4. Slop Oil Tank Warehouse	gal	7 yrs	6/08/84
5.*Heating Oil Tank Clean Sound	550 gal	24 + yrs	6/11/84
6. Garage Waste Oil Tank	(b) (4) gal	24 + yrs	6/11/84
7. O/W Separator Tank Plant #2	gal	5 yrs	6/12/84

* This tank will be removed when empty by Clean Sound. (Spring of 88)


(b) (4)
(b) (4)
(b) (4)
(b) (4)
16th AVE
HYDRANT
FIRE GATE
16th AVE S.W.
HYDRANT
MOTOR TRANSPORT GARAGE
TRUCK WASH
S.W. FLORIDA STREET
3' FIRE WALL
POINTER SHED
TOP LOADING RACK
FIRE LANE
ACCESS
TRUCK PARKING
TRUCK PARKING
CYCLONE FENCE
S.W. LINDER
VAPOR RECOVERY UNITS
GATE
FENCING
BOILER HOUSE
HYDRANT
TRUCK PUMPOFF
PUMP ROOM
HYDRANT
POINTER SHED
HYDRANT
LOADING RACKS
1
2
3
4
OFFICE
WAREHOUSE
70' x 272'
PRODUCT HEADERS
CONTAINMENT BOOM
FLOAT
CONTAINMENT BOOM
FLOAT
PRODUCT HEADER
RESIDENT OPERATOR
SPILL PAN
PLANT #1
ALL TANKS HAVE FIXED FOAM
Color Code for lines
ARCO Supreme gasoline Blue
ARCO Reguler gasoline Red
ARCO Diesel Oil Yellow
ARCO Stove Oil Gray
Commercial Fuels Black
ARCO Clear gasoline White
Marine Terminal
Harbor Island
Atlantic Richfield
Company

APPENDIX A

SOIL BORINGS AND MONITORING WELL LOGS


(b) (4)
DUWAMISH WEST WATERWAY
WHARF DETAIL
VICINITY MAP
SCALE: 1" EQUALS 900'
B-9
B-8
B-2
B-3
B-1
MW-1
MW-2
PLANT 1
R-1
R-2
R-3
S.W. LANDER ST.
N
LEGEND
RECOVERY WELL LOCATION
BORING LOCATION
MONITORING WELL LOCATION
0
110
220
SCALE IN FEET
BORING AND WELL LOCATIONS
ARCO HARBOR ISLAND TERMINAL
SEATTLE, WASHINGTON
EEI ENGINEERING ENTERPRISES, INC.
PROJECT NO. 512-223
FIGURE 2

SOIL MOISTURE TERMINOLOGY

Moisture	Characteristic
Dry	Makes dust
Slightly Moist	Below plastic limit
Moist	At plastic limit
Very Moist	Above plastic limit-- can pump water from silts
Wet	Free water or saturated

TERMS DESCRIBING COMPACTNESS OF COARSE-GRAINED SOILS

Compactness	Corrected SPT Penetration (blows/foot)	Relative Density
Very Loose	0 to 4	0 to 15%
Loose	4 to 10	15 to 40%
Medium Dense	10 to 30	40 to 70%
Dense	30 to 50	70 to 85%
Very Dense	+50	85 to 100%

TERMS DESCRIBING CONSISTENCY OF FINE-GRAINED SOILS

Consistency	SPT Penetration (blows/foot)	Range of Unconfined Compressive Strength (tons/square foot)
Very Soft	2	0.25
Soft	2 to 4	0.25 to 0.50
Medium	4 to 8	0.50 to 1.00
Stiff	8 to 15	1.00 to 2.00
Very Stiff	15 to 30	2.00 to 4.00
Hard	30	4.00

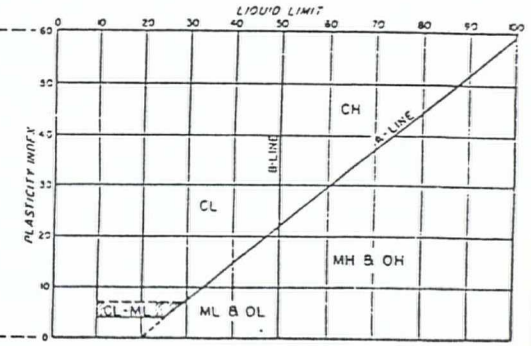
SIZE PROPORTIONS

Designation	Percent by Weight
Trace	0 to 10
Little	10 to 20
Some	20 to 25
And	25 to 50

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (MORE THAN 50 % OF MATERIAL IS LARGER THAN NO 200 SIEVE SIZE)	GRAVEL AND GRAVELLY SOILS (MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO 4 SIEVE)	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS (MORE THAN 50% OF COARSE FRACTION PASSING NO 4 SIEVE)	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN 50 % OF MATERIAL IS SMALLER THAN NO 200 SIEVE SIZE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50)			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

FOR LABORATORY CLASSIFICATION OF FINE-GRAINED SOILS



USCS GRAIN-SIZE RANGES

Component	Millimeters	Size Range U.S. Standard Sieve Size
Cobbles	75	3 inches
Gravel	75 to 4.75	3" to No. 4
Coarse Gravel	75 to 19	3" to 3/4"
Fine Gravel	19 to 4.75	3/4" to No. 4
Sand	4.75 to 0.075	No. 4 to No. 200
Course	4.75 to 2	No. 4 to No. 10
Medium	2 to 0.425	No. 10 to No. 40
Fine	0.425 to 0.075	No. 40 to No. 200
Fines (silt or clay)	0.075	No. 200

SOIL SAMPLE TYPES

- STANDARD SPLIT SPOON
- CALIFORNIA SPLIT SPOON (MODIFIED)
- GRAB SAMPLE
- HAND AUGER

NOTES:

1. DUAL USCS SYMBOL, SUCH AS (SP-SM) DENOTES 5 TO 12% OF MINOR CONSTITUENT.
2. SUBSURFACE INFORMATION FROM BORING AND TEST PIT LOGS DEPICT CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS AT THESE LOCATIONS. ALSO THE CONDITIONS AT THESE LOCATIONS MAY CHANGE WITH TIME.
3. BLOW COUNTS ON LOGS ARE THE NUMBER OF BLOWS TO DRIVE THE SAMPLER 6 INCHES WITH A 140 POUND HAMMER FALLING 30 INCHES.
4. ▽ GROUND WATER LEVEL
5. ▼ HYDROCARBON LEVEL
6. HNU (ppm) = RELATIVE CONCENTRATION OF ORGANIC VAPORS DETECTED IN HEADSPACE OVER SOIL SAMPLE WITH HNU MODEL P101 PHOTOIONIZATION DETECTOR.

KEY TO SOIL SYMBOLS

ENGINEERING ENTERPRISES, INC.

FIGURE A-1

BORING:B-1

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: N/A	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-30-87 / DEPTH: 6.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-30-87 / DATE: 7-30-87	DRILLED BY: John Fisk
BACKFILLED: 7-31-87 / TIME: NA	LOGGED BY: Douglas Hayes
GROUND ELEVATION: NA / BORING DEPTH: 10.0'	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	10		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NAME: ARCO Harbor Island

LOCATION COORDINATES: NA

SCHEDULE	WATER LEVEL
INITIATED: 7-30-87	DEPTH: 6.0'
COMPLETED: 7-30-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10'

PROJECT NO. 512-223

RIG TYPE: Mobil B-23

SAMPLING METHOD: Split Spoon

DRILLING CO: Kring Drilling

DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0	NA	5	SPT	10		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; wet	
5										
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING B-3

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-29-87 / DEPTH: 6.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-29-87 / DATE: 7-29-87	DRILLED BY: John Fisk
BACKFILLED: 7-30-87 / TIME: NA	LOGGED BY: Douglas Haves
GROUND ELEVATION: NA / BORING DEPTH: 10.0'	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0	NA	5	SPT	10		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace fine hydrocarbon on water table
5										
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING:B-4

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE	WATER LEVEL
INITIATED: 7-30-87	DEPTH: 5.0'
COMPLETED: 7-30-87	DATE: 7-30-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Haves
	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	12		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

ENGINEERING ENTERPRISES, INC.

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-31-87 / DEPTH: 5.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-31-87 / DATE: 7-31-87	DRILLED BY: John Fisk
BACKFILLED: 7-31-87 / TIME: NA	LOGGED BY: Douglas Hayes
GROUND ELEVATION: NA / BORING DEPTH: 10.0'	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0	NA	5	SPT	10		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
5										
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING:B-6

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE	WATER LEVEL
INITIATED: 7-30-87	DEPTH: 5.0'
COMPLETED: 7-30-87	DATE: 7-3-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Haves
	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	12		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING B-1

PROJECT NAME: ARCO Harbor Island		PROJECT NO. 512-223
LOCATION COORDINATES: NA		RIG TYPE: Mobil B-23
SCHEDULE	WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-30-87	DEPTH: 5.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-30-87	DATE: 7-30-87	DRILLED BY: John Fisk
BACKFILLED: 7-31-87	TIME: NA	LOGGED BY: Douglas Haves
GROUND ELEVATION: NA	BORING DEPTH: 10.0'	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	9		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NAME: ARCO Harbor Island

PROJECT NO. 512-223

LOCATION COORDINATES: NA

RIG TYPE: Mobil B-23

SAMPLING METHOD: Split Spoon

DRILLING CO: Kring Drilling

DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

SCHEDULE	WATER LEVEL
INITIATED: 7-30-87	DEPTH: 5.0'
COMPLETED: 7-30-87	DATE: 7-30-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	7		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; wet	
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING:B-9

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Hayes
	SHEET 1 OF 1

SCHEDULE	WATER LEVEL
INITIATED: 7-30-87	DEPTH: 5.0'
COMPLETED: 7-30-87	DATE: 7-30-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	7		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; wet	
10										
15										
20										
25										
30										

ENGINEERING ENTERPRISES, INC.

BORING B-10

PROJECT NAME: ARCO Harbor Island

PROJECT NO. 512-223

LOCATION COORDINATES: NA

RIG TYPE: Mobil B-23

SAMPLING METHOD: Split Spoon

SCHEDULE	WATER LEVEL
INITIATED: 7-31-87	DEPTH: 5.0'
COMPLETED: 7-31-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'

DRILLING CO: Kring Drilling

DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS			SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0	NA	5	SPT			▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
5										
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING: B-11

PROJECT NAME: ARCO Harbor Island

PROJECT NO. 512-223

LOCATION COORDINATES: NA

RIG TYPE: Mobil B-23

SAMPLING METHOD: Split Spoon

SCHEDULE	WATER LEVEL
INITIATED: 7-31-87	DEPTH: 5.0'
COMPLETED: 7-31-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'

DRILLING CO: Kring Drilling

DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS	HNU(ppm)		SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT			▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING:B-12

PROJECT NAME: ARCO Harbor Island

PROJECT NO. 512-223

LOCATION COORDINATES: NA

RIG TYPE: Mobil B-23

SAMPLING METHOD: Split Spoon

SCHEDULE	WATER LEVEL
INITIATED: 7-31-87	DEPTH: 5.0'
COMPLETED: 7-31-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION:	BORING DEPTH:

DRILLING CO: Kring Drilling

DRILLED BY: Jonn Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS	HNU(ppm)		SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0	NA	5	SPT	4		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
5										
10										
15										
20										
25										
30										

ENGINEERING ENTERPRISES, INC.

BORING B-10

PROJECT NAME: ARCO Harbor Island

PROJECT NO. 512-223

LOCATION COORDINATES: NA

RIG TYPE: Mobil B-23

SCHEDULE	WATER LEVEL
INITIATED: 7-31-87	DEPTH: 5.0'
COMPLETED: 7-31-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME: NA
GROUND ELEVATION: NA	BORING DEPTH: 10.0'

SAMPLING METHOD: Split Spoon

DRILLING CO: Kring Drilling

DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 OF 1

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS	HNU(ppm)		SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	7		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	Trace free hydrocarbon on water table
10										
15										
20										
25										
30										

EEI ENGINEERING ENTERPRISES, INC.

BORING:B-14

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-31-87 / DEPTH: 5.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-31-87 / DATE: 7-31-87	DRILLED BY: John Fisk
BACKFILLED: 7-31-87 / TIME: NA	LOGGED BY: Douglas Hayes
GROUND ELEVATION: NA / BORING DEPTH: 10.0'	SHEET 1 OF 1

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS	HNU(ppm)		SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	12		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	trace free hydrocarbon on water table
10										
15										
20										
25										
30										

ENGINEERING ENTERPRISES, INC.

BORING B-15

PROJECT NAME: ARCO Harbor Island	PROJECT NO. 512-223
LOCATION COORDINATES: NA	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Split Spoon
INITIATED: 7-31-87 / DEPTH: 5.0'	DRILLING CO: Kring Drilling
COMPLETED: 7-31-87 / DATE: 7-31-87	DRILLED BY: John Fisk
BACKFILLED: 7-31-87 / TIME: NA	LOGGED BY: Douglas Hayes
GROUND ELEVATION: NA / BORING DEPTH: 10.0'	SHEET 1 OF 1

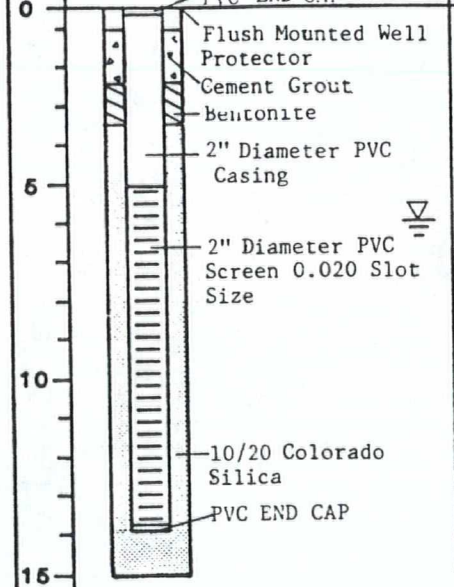
DEPTH IN FEET	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS	HNU(ppm)		SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	REMARKS
0										
5	NA	5	SPT	11		▽	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; sunrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	trace free hydrocarbon on water table
10										
15										
20										
25										
30										

ENGINEERING ENTERPRISES, INC.

WELL:MW-1 BORING:

PROJECT NAME : ARCO Harbor Island	PROJECT NO. 512-223
LOCATION/COORDINATES : NA	RIG TYPE: Mobil B-23
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Hayes
	SHEET 1 OF 1

SCHEDULE	WATER LEVEL
INITIATED: 7-29-87	DEPTH: 6.0'
COMPLETED: 7-29-87	DATE: 7-29-87
BACKFILLED: 7-30-87	TIME: NA
CASING ELEVATION: 9.11	GROUND ELEVATION: 9.65
WELL DEPTH: 14.0'	BORING DEPTH: 15.0'



WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE DATA SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	NA	5.0	SPT	12

ENGINEERING ENTERPRISES, INC.

WELL:MW-2 BORING:

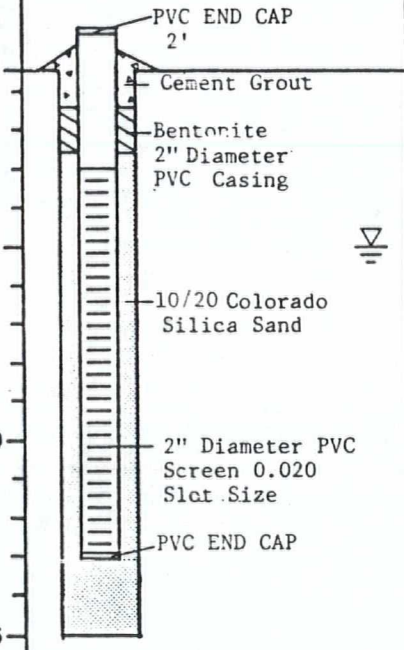
PROJECT NAME : ARCO Harbor Island	PROJECT NO. 512-223
LOCATION/COORDINATES : NA	RIG TYPE: Mobil B-23
SCHEDULE	SAMPLING METHOD: Split Spoon
INITIATED: 7-29-87	WATER LEVEL
COMPLETED: 7-29-87	DEPTH: 6.0'
BACKFILLED: 7-30-87	DATE: 7-29-87
CASING ELEVATION: 8.80	TIME: NA
WELL DEPTH: 14.0'	GROUND ELEVATION: 9.54
	BORING DEPTH: 15.0'
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Hayes
	SHEET 1 OF 1

DEPTH IN FEET	WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
0	PVC END CAP; Flush Mounted Well Protector. Cement Grout; Bentonite; 2" Diameter PVC Casing	SP		SAND; Dark brown; fine to very fine sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	NA	5.0	SPT	15
5	2" Diameter PVC Screen 0.020 Slot Size							
10	10/20 Colorado Silica							
15	PVC END CAP							
20								
25								
30								

EEI ENGINEERING ENTERPRISES, INC.

WELL:MW-3 BORING:

PROJECT NAME : ARCO Harbor Island	**PROJECT NO.** 512-223
LOCATION/COORDINATES : NA	**RIG TYPE:** Mobil B-23
SCHEDULE	**WATER LEVEL**
INITIATED: 7-30-87	**DEPTH:** 5.0'
COMPLETED: 7-30-87	**DATE:** 7-30-87
BACKFILLED: 7-31-87	**TIME:** NA
CASING ELEVATION: 11.45	**GROUND ELEVATION:** 9.35
WELL DEPTH: 13.0'	**BORING DEPTH:** 15.0'
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Hayes
	SHEET 1 **OF** 1

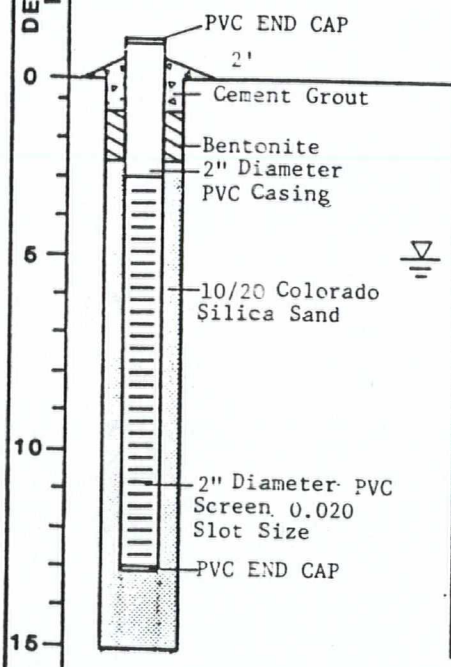


DEPTH IN FEET	WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
0								
5		SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	NA	5.0	SPT	10
10								
15								
20								
25								
30								

ENGINEERING ENTERPRISES, INC.

WELL:MW-4 BORING:

PROJECT NAME : ARCO Harbor Island	**PROJECT NO.** 512-223
LOCATION/COORDINATES : NA	**RIG TYPE:** Mobil B-23
SCHEDULE	**WATER LEVEL**	**SAMPLING METHOD:** Split Spoon
INITIATED: 7-30-87	**DEPTH:** 5.0'	**DRILLING CO:** Kring Drilling
COMPLETED: 7-30-87	**DATE:** 7-30-87	**DRILLED BY:** John Fisk
BACKFILLED: [illegible]	**TIME:** NA	**LOGGED BY:** Douglas Hayes
CASING ELEVATION: 10.94	**GROUND ELEVATION:** 8.89	**SHEET** 1 **OF** 1
WELL DEPTH: 13.0'	**BORING DEPTH:** 15.0'	

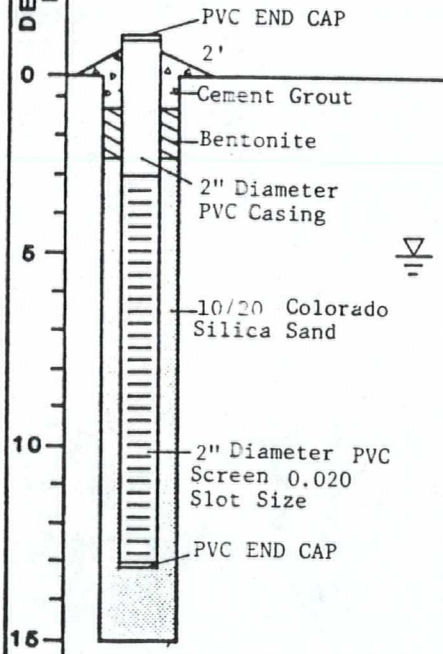


WELL CONSTRUCTION	USCS	SYMBOL	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; some shell fragments; hydrocarbon saturated; wet	NA	5.0	SPT	10

ENGINEERING ENTERPRISES, INC.

WELL:MW-5 BORING:

PROJECT NAME : ARCO Harbor Island	PROJECT NO. 512-223
LOCATION/COORDINATES :	RIG TYPE: Mobil B-23
SCHEDULE	WATER LEVEL
INITIATED: 7-31-87	DEPTH: 5.0'
COMPLETED: 7-31-87	DATE: 7-31-87
BACKFILLED: 7-31-87	TIME:
CASING ELEVATION: NA	GROUND ELEVATION: NA
WELL DEPTH: 13.0'	BORING DEPTH: 15.0'
	SAMPLING METHOD: Split Spoon
	DRILLING CO: Kring Drilling
	DRILLED BY: John Fisk
	LOGGED BY: Douglas Hayes
	SHEET 1 OF 1



WELL CONSTRUCTION	USCS	SYMBOL	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet	NA	5.0	SPT	10

ENGINEERING ENTERPRISES, INC.

WELL:R-1 BORING:

PROJECT NAME : ARCO Harbor Island

LOCATION/COORDINATES : NA

PROJECT NO. 512-223

RIG TYPE: Mobil B-23

SAMPLING METHOD: Auger cuttings

DRILLING CO: Kring Drilling

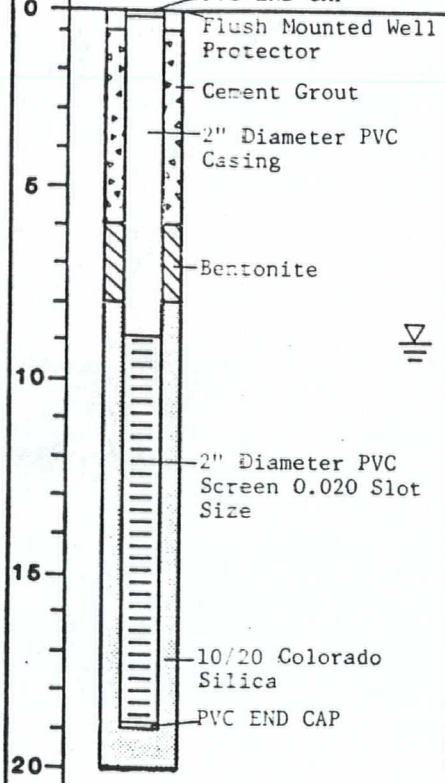
DRILLED BY: John Fisk

LOGGED BY: Douglas Hayes

SHEET 1 **OF** 1

SCHEDULE	
INITIATED:	7-27-87
COMPLETED:	7-27-87
BACKFILLED:	7-31-87
CASING ELEVATION:	12.56
WELL DEPTH:	19.0'

WATER LEVEL	
DEPTH:	9.0'
DATE:	7-27-87
TIME:	NA
GROUND ELEVATION:	13.29
BORING DEPTH:	20.0'



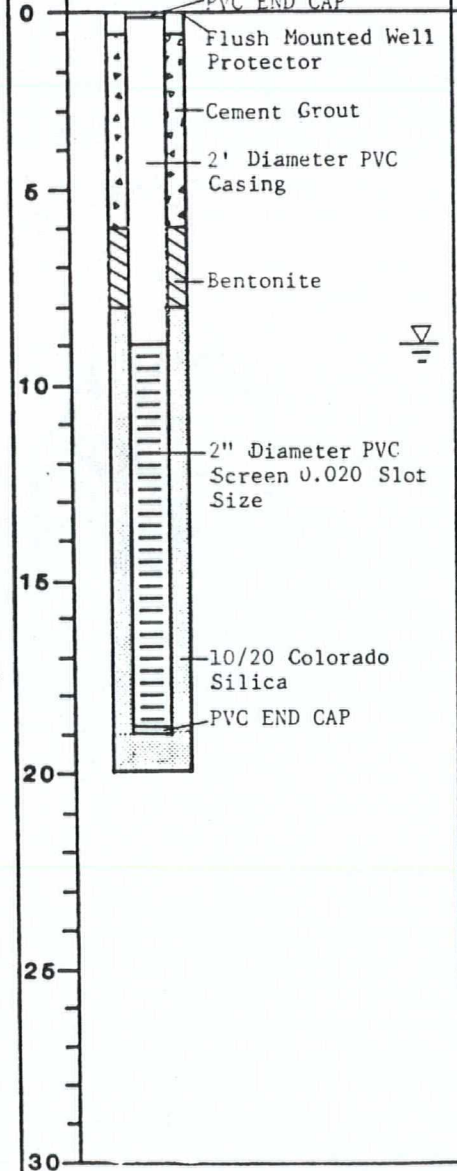
WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; free hydrocarbons present; wet				

NOTE: Soil descriptions are from auger cuttings

ENGINEERING ENTERPRISES, INC.

WELL:R-2 BORING:

PROJECT NAME : ARCO Harbor Island	PROJECT NO. 512-223
LOCATION/COORDINATES : NA	RIG TYPE: Mobil B-23
SCHEDULE / WATER LEVEL	SAMPLING METHOD: Auger cuttings
INITIATED: 7-28-87 / DEPTH: 9.0'	
COMPLETED: 7-28-87 / DATE: 7-28-87	DRILLING CO: Kring Drilling
BACKFILLED: 7-31-87 / TIME: NA	DRILLED BY: John Fisk
CASING ELEVATION: 12.56 / GROUND ELEVATION: 13.35	LOGGED BY: Douglas Hayes
WELL DEPTH: 19.0' / BORING DEPTH: 20.0'	SHEET 1 OF 1



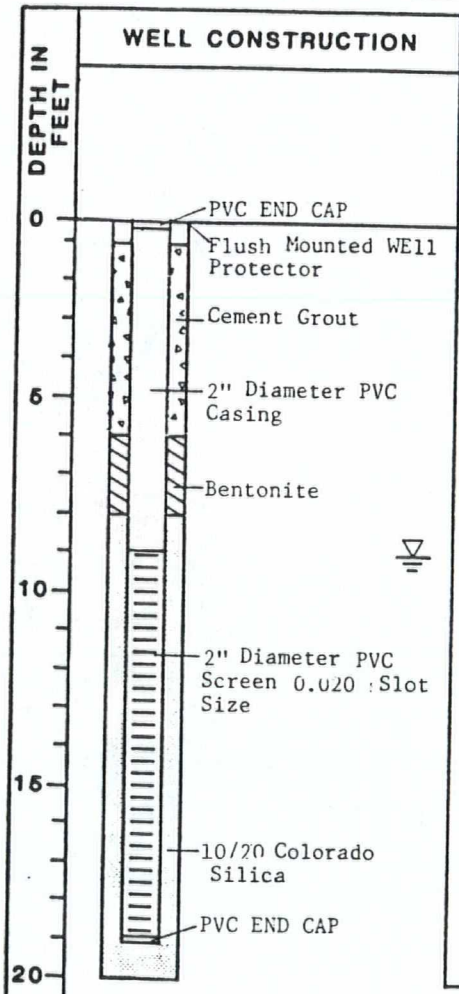
WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
			SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; hydrocarbon saturated; wet				

NOTE: Soil descriptions are from auger cuttings

ENGINEERING ENTERPRISES, INC.

WELL:R-3 BORING:

PROJECT NAME : ARCO Harbor Island	**PROJECT NO.** 512-223
LOCATION/COORDINATES : NA	**RIG TYPE:** Mobil B-23
SCHEDULE	**WATER LEVEL**	**SAMPLING METHOD:** Auger Cuttings
INITIATED: 7-29-87	**DEPTH:** 9.0'	
COMPLETED: 7-29-87	**DATE:** 7-29-87	**DRILLING CO:** Kring Drilling
BACKFILLED: 7-31-87	**TIME:** NA	**DRILLED BY:** John Fisk
CASING ELEVATION: 13.00	**GROUND ELEVATION:** 13.31	**LOGGED BY:** Douglas Hayes
WELL DEPTH: 19.0'	**BORING DEPTH:** 20.0'	**SHEET** 1 **OF** 1



WELL CONSTRUCTION	SOIL TYPE USCS	SOIL TYPE SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DEPTH	SAMPLE TYPE	BLOWS
	SP		SAND; Dark brown; fine to very fine; sand primarily quartz; subrounded to subangular; poorly graded; some shell fragments; free hydrocarbon present; wet				

NOTE: Soil descritptions are from auger cuttings.

ENGINEERING ENTERPRISES, INC.